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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,570	03/30/2006	Hindrick Freerk Bulthuis	GEML 4671-3	9934
54413 7590 07/21/2008 GEMFIRE c/o HAYNES BEFFEL & WOLFELD LLP P.O. BOX 366 HALF MOON BAY, CA 94019			EXAMINER PETKOVSEK, DANIEL	
			ART UNIT 2874	PAPER NUMBER
			MAIL DATE 07/21/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/536,570	<b>Applicant(s)</b> BULTHUIS ET AL.	
	<b>Examiner</b> DANIEL PETKOVSEK	<b>Art Unit</b> 2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on amendment filed April 18, 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-18, 25 and 26 is/are allowed.
- 6) ☒ Claim(s) 19-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on May 26, 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/18/08</u> .   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This office action is in response to the amendment filed April 18, 2008. In accordance with the amendment, claims 1, 11, 19, and 22 have been amended, while new claims 25 and 26 have been added.

Claims 1-26 are pending.

#### ***Information Disclosure Statement***

1. The prior art documents submitted by Applicant in the Information Disclosure Statements filed on April 18, 2008, have been considered and made of record (note attached copy of forms PTO-1449).

#### ***Allowable Subject Matter***

2. Claims 1-18, 25, and 26 are allowed. The following is an examiner's statement of reasons for allowance: the closest prior art of record (Hashizume et al. NPL; Arai et al. '018; Hatanaka '510) does not teach or reasonably suggest, in combination, an optical branching component as claimed by sole independent claim 1 further in which the coupling *strength* of at least one optical coupler *monotonically decreases with increasing wavelength throughout* the operational wavelength region of the component. Claims 2-18, 25, and 26 are dependent upon claim 1. Also, see Applicant's arguments filed April 18, 2008, which explain how the closest prior art of record does not teach or reasonably suggest the limitation "the coupling *strength* of at least one said optical coupler *monotonically decreases with increasing wavelength throughout* (entire) the operational wavelength region of the component".

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 19-22 are rejected under 35 U.S.C. 102(a/b) as being anticipated by Hashizume et al. NPL (cited in IDS filed March 30, 2006).

Hashizume et al. NPL teaches (Figure 1, Design, Experimental Result) an optical branching component comprising: two optical waveguides 1, 2 coupled between two optical couplers, wherein there is an effective optical path length difference between the two waveguides, and wherein each optical coupler comprises a multi-mode interference waveguide configured to support at least two guided modes, and each said optical coupler is capable of being optimized to achieve a minimum polarization dependency of

the said optical coupler within a predetermined operational wavelength region, which clearly, fully meets Applicant's *claimed structural* limitations of independent claim 19.

The Examiner notes that the limitation "being optimized to achieve minimum polarization dependency" is purely functional language. Further, this language is relative, since the term "minimum" is not defined by any particular boundaries. Hashizume et al. NPL meets all claimed structural limitations of claim 19, and is capable of meeting the claimed function.

Regarding claim 20, the geometry of each optical coupler is capable of being optimized to achieve a minimum polarization dependency of the said optical coupler (functional language).

Regarding claim 21, silica on silica technology is disclosed.

Regarding independent claim 22, the optical system is configured so that the two optical waveguides 1, 2 bend away from one another along at least a portion of their lengths, being in proximity with one another in at least one *region immediately* adjacent the MMI waveguide in which the region the waveguides are substantially straight.

5. Claims 19, 20, and 22 are rejected under 35 U.S.C. 102(b/e) as being anticipated by Arai et al. US 2001/0051018 A1.

Arai et al. US 2001/0051018 A1 (currently U.S.P. No. 6,631,223 B2) teaches (ABS, Figs. 1A, 9, 10, 11A, [0041]-[0043]) an optical branching component comprising: two optical waveguides 10, 11 coupled between two optical couplers 6, 7, wherein there

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is an effective optical path length difference between the two waveguides, and wherein each optical coupler comprises a multi-mode interference (MMI) waveguide configured to support at least two guided modes, and each said optical coupler is capable of being optimized to achieve a minimum polarization dependency of the said optical coupler within a predetermined operational wavelength region, which clearly, fully meets Applicant's *claimed structural* limitations of independent claim 19. The Examiner notes that the limitation "being optimized to achieve minimum polarization dependency" is purely functional language. Further, this language is relative, since the term "minimum" is not defined by any particular boundaries. Arai et al. '018 meets all claimed structural limitations of claim 19, and is capable of meeting the claimed function.

Regarding claim 20, the geometry of each optical coupler is capable of being optimized to achieve a minimum polarization dependency of the said optical coupler (again functional language).

Regarding independent claim 22, the optical system is configured so that the two optical waveguides 10, 11 bend away from one another along at least a portion of their lengths, being in proximity with one another in at least one *region immediately* adjacent the MMI waveguide 6, 7 in which the region the waveguides are substantially straight.

6. Claims 19 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Hatanaka U.S.P. No. 6,922,510 B2.

Hatanaka U.S.P. No. 6,922,510 B2 teaches (Fig. 6 and 8) an optical branching component comprising: two optical waveguides coupled between two optical couplers, wherein there is an effective optical path length difference between the two waveguides, and wherein each optical coupler comprises a multi-mode interference waveguide *configured to* support at least two guided modes, and each said optical coupler is capable of being optimized to achieve a minimum polarization dependency of the said optical coupler within a predetermined operational wavelength region, which clearly, fully meets Applicant's *claimed structural* limitations of independent claim 19. The Examiner notes that the limitation "being optimized to achieve minimum polarization dependency" is purely functional language. Further, this language is relative, since the term "minimum" is not defined by any particular boundaries. Hatanaka '510 meets all claimed structural limitations of claim 19, and is capable of meeting the claimed function.

Regarding claim 20, the geometry of each optical coupler is capable of being optimized to achieve a minimum polarization dependency of the said optical coupler (again functional language).

Regarding independent claim 22, the optical system is configured so that the two optical waveguides bend away from one another along at least a portion of their lengths, being in proximity with one another in at least one *region immediately* adjacent the MMI waveguide in which the region the waveguides are substantially straight.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashizume et al. NPL (cited in Applicant provided IDS).

Hashizume et al. NPL teaches (Figure 1, Design, Experimental Result) an optical coupler comprising: two optical waveguides 1, 2 which bend away from one another along at least a portion of their lengths and which are coupled together along at least a portion of their lengths by at least one MMI waveguide which is configured to support at least two guided modes, and which are in *proximity* with one another in at least one region immediately adjacent the MMI waveguide in which region the waveguide are *substantially straight* (see design and results), which clearly, fully meets Applicant's *claimed structural* limitations.

Hashizume et al. NPL does not *explicitly* teach the dependent claim limitations of claims 23 and 24, in which the optical coupler comprises a single MMI waveguide configured to support only two guided modes, or in which the optical coupler comprises two MMI waveguides each configured to support only two guided modes.

Regarding claims 23 and 24, Hashizume et al. NPL does not explicitly teach that the MMI waveguides are configured to support *only* two guided modes. The Hashizume et al. NPL reference is silent to this exact limitation. However, a person having ordinary



skill in the art at the time the invention was made would have recognized that using optical waveguides that support only two modes would have been an obvious modification (if not actually inherent in Hashizume et al. NPL). Guiding only two modes would eliminate the chances for substantial errors to be passed in case of a malfunction in the coupling system. See *KSR v. Teleflex*, 127 S.Ct. 1727 (2007).

### ***Response to Arguments***

9. Applicant's arguments, see amendment with remarks, filed April 18, 2008, with respect to independent claim 1 (claims 2-18, 25, and 26 dependent therefrom) have been fully considered and are persuasive. The prior art of record does not teach or reasonably suggest the specific claim limitation that "the coupling *strength* of at least one said optical coupler *monotonically decreases with increasing wavelength throughout* the operational wavelength region of the component". The rejections of claims 1-18 have been withdrawn (claims 25 and 26 newly presented).

10. Applicant's arguments filed April 18, 2008 with respect to independent claims 19 and 22 have been fully considered but they are **not** persuasive.

First, Applicant traverses the rejections to independent claim 19 to all three prior art references (Hashizume et al. NPL; Arai et al. '018; Hatanaka '510) by asserting that these prior art references do not teach the couplers to be "optimized to achieve a minimum polarization dependency of the said optical coupler". The Examiner respectfully disagrees with this assertion. This type of claim language does not impart any structure to patentably distinguish from the cited prior art of record, and is purely functional (*optimization*) language. The prior art of record is capable of being "optimized

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to achieve a minimum polarization dependency of the said optical coupler". Further it is noted that the term "minimum" is relative in nature and is thus met by prior art. The 35 U.S.C. 102 rejections above fully address independent claim 19.

11. Second, Applicant traverses the rejections to independent claim 22 to all three prior art references (Hashizume et al. NPL; Arai et al. '018; Hatanaka '510) by asserting that the two waveguides are not in proximity with one another in at least one region immediately adjacent the MMI waveguide in which region the waveguides are substantially straight. The Examiner respectfully disagrees with this assertion. First, the waveguides 1 and 2 have *substantially* straight portions that are immediately adjacent MMI waveguide (could be infinitesimally small portions). The claims do not assert any frame of reference, in which the waveguides are substantially straight or parallel *with respect to each other*. Further, the term "region" is very broad and even the substantially straight portions (after the bending outward) would fall within this "region" that is immediately adjacent to the MMI waveguide (i.e. Nebraska is in a region, the United States, that is immediately adjacent to Canada. However, Nebraska by itself is not immediately adjacent to Canada). Applicant does not claim a coupler having straight portions immediately adjacent to an MMI waveguide, but merely that the straight portions are in a "region" immediately adjacent. The 35 U.S.C. 102 rejections above fully address independent claim 22.

12. Claims 20, 21, 23, and 24 are dependent from claims 19 or 22, and are fully addressed in the 35 U.S.C. 102 or 103 rejections above.

***Inventorship***

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

***Conclusion***

14. Applicant's amendment necessitated any new grounds of rejection that may have been presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL PETKOVSEK whose telephone number is (571)272-4174. The examiner can normally be reached on M-F 8:30-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel Petkovsek/  
Patent Examiner, Art Unit 2874  
July 17, 2008

/Sung H. Pak/  
Primary Examiner, Art Unit 2874